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ABSTRACT

The sector approach to analysis of nation-wide learning services is a means of viewing all aspects of national development from the perspective of human resources. Such an approach requires a descriptive national profile; an analysis in terms of dynamics, output, goals, and constraints; a strategy to achieve the goals; and a plan to actualize them. Various perspectives in a sector assessment of education are possible depending upon the role played by education within national priorities: social demand, national development, manpower needs, economic returns, and employment generation. Implementing a sector assessment requires consideration of key elements such as sponsorship, identification of goals and perspectives, and needs for and limitations of quantitative analysis. Recognition, definition, and consideration of opportunities within employment institutions, formal education, and nonformal education and training are also critical. Three methodological approaches widely recognized and implemented relative to national perspective -- manpower surveys, returns to investment in education, and tracer studies -- give an idea of the possibilities and liabilities available in sector analysis. (JH)

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# Preface

With the publication of Frederick Harbison's "Educational Sector Planning For Development of Nation-Wide Learning Systems," the Overseas Liaison Committee recognizes another pioneering effort by one of the world's foremost authorities on education and the development of human resources. In this paper Professor Harbison goes beyond formal schooling to consider learning opportunities in the broader context of the living and working environment. Professor Harbison is the author of numerous papers and books; his most recent book, Human Resources as the Wealth of Nations, was published by Oxford University Press in 1973.

Carl Keith Eicher
Chairman, Overseas Liaison Committee
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## I. EDUCATION SECTOR PLANNING*

1. The Sector Approach: In economic terminology, a sector is a rather clearly defined constituent segment of an economy, but as applied to developing countries the term is used quite loosely. Frequent reference is made to the "agricultural sector," the "modern sector," the "traditional sector," or more narrowly the "manufacturing sector," the "transportation sector," or the "commercial sector." Today, many developing countries and concerned donor agencies are talking about the "education sector," stressing the need for a "sector-wide" approach to education, training, and other learning services. The primary objective is to supplant the project-by-project approach, and thus to provide a comprehensive view of all education and training activities and their interrelationships in order to identify the most strategic projects for national investment and possible external assistance. The sector approach requires wider ranges of data and more sophisticated analysis in order to formulate broad strategies of human resource development and utilization. Its objective in essence is comprehensive and rational planning of all education and training activities. The sector approach, moreover, goes far beyond the traditional boundaries of formal education; it encom-

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*This paper was originally prepared in expanded form, including short summaries of country experience, for the Technical Assistance Bureau of the U.S. Agency for International Development (AID). This mimeographed version is available under the title The Development of Nation-Wide Learning Systems-A Sector Approach for Assessment of National Development from a Human Resources Perspective from the Research Program in Economic Development, Woodrow Wilson School, Princeton University, Princeton, New Jersey 08540, U.S.A.

passes training and human resource development in other sectors such as agriculture, industry, health, nutrition, and public service. Thus, unlike other sectors, education or the nation-wide learning system is not a relatively self-contained system. It has multiple intersections with almost every facet of national development. In reality, the sector approach involves a comprehensive analysis of national development from a human resources perspective.

The sector approach often includes four levels of activity. The first and simplest is the sector survey which is a descriptive profile of part or all of a country's system of education and training. The second might be called sector analysis. This usually involves a study of the dynamics of the sector's operations in producing outputs, the analysis of alternative policies for achievement of specified goals, and an evaluation of constraints and feasibility of various courses of action. The third, sector strategy, which might or might not be based on a sector analysis, attempts to identify the courses of action required to meet chosen objectives or targets. And finally, the sector plan or program is a set of activities to be undertaken in a specified time period to implement a sector strategy. This paper is concerned with all four of these activity levels. Indeed, they all must be considered together in any coherent program for human resource development. Throughout this paper, the term "assessment" will serve as a shorthand symbol for all four in the aggregate.

The term nation-wide learning system is used to encompass all learning processes: in formal schools, in nonformal education, in employment, and in the working environment. It postulates that every participant in the active population or labor force is a potential learning station. It stresses the idea of universal opportunity for learning by both adults and children

as a means of maximizing the effectiveness of all members of the labor force and of all elements of the population as human beings and citizens. The major components of the learning system are: (1) the skill and knowledge generating functions of working environments and employing institutions; (2) broadly based pre-employment formal education at all levels; and (3) out-of-school education and training services through a wide variety of programs, both public and private, aimed at developing more perceptive and knowledgeable people capable of entering and performing the widest possible range of occupations. The nation-wide learning system thus connotes the continuous or recurrent generation of the skills, knowledge, and capacities of man. In economic terms, it encompasses all processes of human capital formation.

2. Alternative Perspectives for Analysis: In any sector assessment one must be aware of "what he is solving for." Assessments can be made from a variety of perspectives which stem from stated or implied goals. Thus, the starting point in a sector assessment in a developing country is the identification of national goals. Sometimes goals are explicitly stated, as for example in Tanzania's Arusha Declaration[1] and related manifestos. More often, they are implied in speeches of national leaders and statements of political parties. In some cases, goals are assumed by outside advisors, such as economists or educationists, who may be asked to assist in formulation of development plans. In rare instances, as in the recent Education Sector Review in Ethiopia[2] a "working party" of experts is charged with the task of drawing up a statement of consensus on national goals and aspirations. In any case, the goals determine the perspectives for analysis, and the perspectives govern the scope of the assessment, the orientation of studies, the choice of relevant facts and data, and the priority problems for which

solutions are sought. In evaluating any sector assessment, therefore, it is imperative to detect the perspectives; in most cases, this is difficult since perspectives are seldom clearly specified or consistently utilized.

Another important consideration is "breadth of vision". From any perspective, it is possible to look at education or learning systems broadly or narrowly. For example, most education sector reviews have been confined to formal education, and some are even limited to specific levels such as primary, secondary or higher education. More recently, the scope has been extended to include some nonformal education and training.

The most commonly stated or implied perspectives for sector assessments are the following:

The first, and perhaps most widely used, is the social demand approach In this perspective, the important consideration is how much education is demanded or thought to be desirable. A basic premise is that education, and particularly primary education, is a universal human right. Secondary education should be available for all primary school completers who are qualified, and higher education should be available to as many secondary school finishers as possible. The idea is to provide maximum opportunity for schooling for all who want it, limited only by the financial and human resource constraints of a particular society. This perspective is prevalent among most ministries of education as well as teachers and other members of the formal educational establishment. Quantitative expansion of all levels of education is taken as a cardinal objective, usually on the basis of "more of the same", although improvement in quality is often stressed as an important objective as well. Intense political pressure from the electorate strongly reinforces this position.

A second basic approach is that of needs for national development. Here the emphasis is on producing the skills and knowledge which are relevant to the economic, political, and social goals of the nation. In short, the needs of the country are assumed to have priority over the demands or wishes of individuals in the society. The needs for national development perspective, however, can be narrowly or broadly specified.

For example, the so-called manpower needs approach is narrowly focused. Characteristically, it views the education or learning system as a producer of skills and knowledge primarily for the modern sectors of developing countries. Most manpower requirement surveys are limited to needs for high-level professional and administrative personnel and middle-level technicians and functionaries employed for wages and salaries in the modern sector enclaves. The manpower requirements approach is also oriented to economic rather than broader political or social development. Because of its limited viewpoint, this approach is subject to mounting criticism. Some critics, such as economist Kenneth Boulding, find the whole manpower approach repulsive, disgusting, dangerous and "incompatible with the ideas of liberal democracy." Boulding sees it as appallingly crude, and argues that simply counting noses is quite unrealistic.[3] Others condemn it as ignoring the role of the masses of rural and urban workers. Nevertheless, the view that education and learning systems should be developed at least in part in response to manpower considerations is still widely accepted.

Another narrow perspective within the needs for national development approach is that of economic returns. In this case, investment in education is based on cost-benefit analysis which relates the monetary costs of education and foregone earnings to life-time earnings of persons with different levels or amounts of education. This approach has been attempted in a

number of countries, but as yet has had very little impact on policy formulation. The reasons are many: inadequate data, particularly on life-time earnings streams; conceptual weaknesses such as the assumption that earnings of individuals in developing countries adequately reflect productivity or usefulness in the economy; recognition of shortcomings of income or GNP as the only or even the principal target of national development; and the conviction that the benefits of education must be measured by humanitarian as well as economic criteria. However, the appeal of the cost-benefit approach to economists is strong since it provides a rationale for incorporating education and training programs into the apparatus of planning for economic growth.

In relating learning services to national needs, consideration must be given to cultural, social, and political as well as economic development. Man lives by more than bread alone. Education is important for building consensus, articulating values, and making man more sensitive to his environment and his fellow human beings. Any attempt to build education and training solely on the basis of economic criteria is socially and politically unviable in today's developing countries. Increasingly, it is suggested that it may be time to "dethrone" GNP as the sole and all-encompassing target of national development. The major difficulties here, of course, are that non-economic goals are difficult to specify and, for the most part, impossible to quantify. As the range of vision in looking at national development needs broadens, therefore, sector assessments become more qualitative and less precise or "rigorous" in analytical design.

Another basic approach is that of <u>employment generation</u>. Essentially this is a national needs approach based upon a specific problem perspective. Here the assumption is that unemployment and other manifestations of under-

utilization of human resources are the most critical problems facing present-day developing countries. The expansion of opportunities for more productive employment for all segments of the population is taken, therefore, as the principal goal. The rationale is that the maximum utilization and appropriate development of the capabilities of the entire labor force will lead not only to higher levels of income but, even more important, to more equitable distribution of the fruits of progress. Economic prosperity is thus the consequence of effective human resource utilization and development. This approach has been articulated in recent country studies undertaken by the International Labor Organization (ILO).[4] A manpower requirements approach, of course, is implicit in the employment generation perspective, but it stresses the assessment of working opportunities for the masses in the traditional and intermediate sectors as well as high-level manpower development in the modern sector enclaves. The employment generation perspective is now attracting great interest because of the mounting economic and political problems of underutilization of human resources and growing disparities between the rich and the poor in most developing countries, even those with very high rates of economic growth. Suffice it to say, the employment generation approach looks at all education, training, and learning activities in terms of their relevance to the creation of and preparation for employment opportunities.

In practice, most sector assessments are made from various combinations of these perspectives. In many instances, however, the perspectives and the goals from which they stem are implied rather than openly stated. Sometimes the goals are contradictory. Since the chosen goals and perspectives will vary from country to country, it is not feasible to construct a single model or blueprint for a sector assessment applicable to all kinds

of economies. Nevertheless, there are some considerations which are common in all of the approaches which may be mentioned briefly:

1. The criterion of access to education or learning opportunity is central to all approaches. Which persons or groups gain access to primary, secondary, or higher education, and on what basis do they acquire such access? And what groups never attain access to any formal education at all?

2. Another consideration is the orientation of educational or learning programs. Is the purpose of education mainly to prepare persons for higher levels of formal education? Is the curriculum primarily geared to tests or examinations? Is the teaching and subject matter of schools relevant to the lives of those attending them? Most sector assessments stress some kind of educational reform, which usually involve broadening of access, improvement of quality, and changing of emphasis in schooling.

3. Another essential consideration is the nature of constraints, both human and financial. How much can a country spend, as a proportion of GNP or government revenues, on education and learning services? How can the financial burden be properly allocated? Does the country have the capacity to train the required teachers? And how can other restraints such as, for example, bureaucratic rigidity or traditional stagnation be alleviated?

4. Finally, nearly all sector assessments are concerned at some point with internal efficiency. Here the central consideration is increasing the outputs of education and training programs, while stemming the rise in unit costs. Education as an industry is inherently inefficient. It is a labor-intensive activity, and is subject to an iron law of rising costs. As it modernizes, its per-unit expenditures tend to rise sharply. Thus, from whatever perspective one looks at education and training, "getting more for the buck" is a crucially important consideration.

3. Examples of Assessment: In a growing number of countries, some kind of sector assessments have been made or are in progress. For the most part, they are narrow in scope, being confined mainly to the formal education system and often to particular levels.

In Latin American countries, with the support of U.S. AID's sector-loan program, a number of formal education surveys have been made.[5] In recent years, the World Bank has fielded "Project Identification Missions" to make overall assessments of the education systems in countries a basis

for selecting the most eligible projects for loans. Unfortunately, these assessments are unpublished and many of the best ones are still classified as confidential. Some encompass analysis of nonformal education as well as formal schooling.[6] An extensive and elaborate assessment was made in India in 1966. A broadly based group of experts, both from within the country and abroad, surveyed the entire field of education and made proposals for development of all stages and elements of education and training.[7]

Perhaps the most ambitious and comprehensive assessment to date is the Education Sector Review made by the Government of Ethiopia in 1972,[8] which combines a complete sector study, sector analysis, and proposals for alternative long-range programs of development of education and training. This Review is in large measure the result of "a spirit of constructive dissatisfaction" with the country's education system and much debate among educators, parents, government officials and students. Another factor was the desire of the World Bank for a comprehensive assessment as a basis for identification of projects. In this case, however, the Bank did not commission a project identification mission of outsiders to make the assessment; instead it lent its moral and financial backing to a self-assessment by the Ethiopians themselves.

The Education Sector Review mobilized a large team of experts to undertake the assessment, organized into fourteen task forces and five small working groups to examine all aspects of education and training in Ethiopia. In all, 81 persons participated actively in these groups; 51 were Ethiopians drawn from the Haile Sellassie I University, the Ministry of Education, and other government agencies. The foreign members of the Task Forces were, for the most part, residents in Ethiopia on contract with various external assistance agencies. A few outside experts were also

employed on a short-term basis. As sounding-board mechanisms, there was a symposium in January, 1972 to review initial reports and study plans, and a conference in July, 1972 to review the entire assessment. It is clear that the Education Sector Review effectively mobilized and utilized national expertise and reflected the aspirations and knowledge of the broadest possible Ethiopian base. As a result of the national debate to which the best minds and talents contributed, there appears to be wide consensus on the deficiencies of the present education system and on a set of alternative reforms carefully related to national priorities and resources.

Finally, the country studies made by the ILO teams in Colombia, Kenya, Ceylon, and Iran appraised education and training from the perspective of employment generation and the effective utilization of human resources.[9] Although country studies, of course, cover much broader territory than assessment of education and learning services, they do examine the education and training sector as an important element in building a full employment economy. And, although they underemphasize working environments and nonformal education programs, their range of vision goes far beyond mere formal schooling.

Other general materials are also quite valuable. For example, The Guidelines for Sector Reviews and Pre-Investment Study Programs, prepared by C. Van Dijk and M. Hultin for the Education Projects Division of the World Bank (IBRD), includes a precise conceptual statement of education sector reviews, suggested procedural steps, and detailed check-lists of important areas for investigation. It is the most advanced framework for analysis so far available. From the much narrower perspective of formal education, the Latin American Bureau of U.S. AID has prepared a useful document entitled: The Sector Approach: Interim Guidelines for the

Preparation of a Sector Analysis, a Sector Strategy, and a Sector Loan based largely upon experience of AID in Brazil during the late 1960's. Its scope is limited to primary and secondary education. Undoubtedly, other blueprints are in preparation and will serve to specify in more concrete terms the "nuts and bolts" of the sector approach.

To summarize, experience with sector-wide planning of educational development is accumulating rapidly. Unfortunately, most of this experience is not yet published or easily available. Nevertheless, through direct contact with international organizations and individual countries, serious investigators may be able to learn a great deal about the problems, successes, and pitfalls of this approach.

It is useful to examine the considerations which appear to be most important in making sector assessments. These are based on careful examination and evaluation of country experiences.

## II. KEY ELEMENTS IN BUILDING NATION-WIDE LEARNING SYSTEMS

This section is intended to contribute to the methodology of the sector approach by analyzing a number of key elements or strategic points of departure for the design of a comprehensive strategy for development of nation-wide learning systems. In nearly every developing country, good statistics and adequate data are meager. But lack of a proper informational base is no reason for deferring comprehensive sector assessments. Indeed, such assessments are essential prerequisites for the identification of the kinds of quantitative data which will be most useful for the proper development of a nation-wide learning system.

1. Sponsorship of the Assessment: Who is to undertake the assessment and for what purpose? This is the first question to consider.

Most experts agree that there should be "maximum possible participation" by the host country in making any kind of sector review. Here there is a wide range of possibilities. An external sponsoring agency may employ local nationals to carry out the necessary studies. It may consult with and secure the advice of the appropriate ministries of the client country in the design of the project. It may submit initial drafts for comment and suggestions. Or, as in the case of the recent exercise in Ethiopia, it may offer to finance a self-study on the part of the government itself. U.S. AID has sometimes relied upon its own country staff for sectoral reviews, as in the case of Colombia; or commissioned a private organization in the United States, as in the case of Korea with Florida State University and, earlier, in Nigeria with Education and World Affairs, Inc. These considerations are more political than technical. Yet, the success of the project and the ultimate implementation of any strategy which may be evolved are crucially dependent upon the receptivity, understanding, involvement, and support of prime movers in the host country.

2. Identification of Goals and Selection of Perspectives: Once the question of sponsorship and participation is settled, the articulation of goals and perspectives is the next bridge to cross. This is where many attempts fall into deep water. It is easy, of course, for external agencies or experts to postulate goals. Some economists may say that the goal of the learning system should be to promote economic growth, using as a perspective some combination of the manpower approach and cost-benefit analysis. Lately, U.S. AID has stressed efficiency through better management, appropriate technologies, and cost-reducing measures. A frequently expressed goal is "improvement in quality ahead of expansion of numbers," usually

implying some reform in orientation of the education system as well as employment of better trained teachers. The ILO, as pointed out earlier, assumes that full employment is the cardinal goal, and looks at education and training as major instruments for achieving it.

Yet, what indeed are the goals of the country which is about to undergo a review? The local elites may have different interests from the masses. In some countries, statesmen do or must give priority to political over economic objectives. Without a clearly stated ideology, as for example in Tanzania, it is difficult to identify a consensus. In some cases, however, an appointed task force may be charged with articulating goals and objectives. All countries, however, have more than a single goal in national development, and thus assessments of their learning systems usually will call for more than one analytical perspective. The statement of national goals and educational objectives in the Ethiopian Education Sector Review is a good example.[10]

3. Appraisal of Learning Opportunities Provided by Employing Institutions: If economic growth and expansion of employment opportunities are included among a country's national goals, then an analysis of the processes of human resource development in the world of work is the most realistic starting point for the study of a learning system. Indeed, one of the most serious shortcomings of existing education sector reviews is the failure to assess the skill and knowledge-generating function of the principal employing institutions.

Man builds his skills and knowledge routinely and often unconsciously through learning-by-doing, being instructed or inspired by others to perform specific tasks, through association with peers and fellow workers, or simply by participation in a working environment or in the affairs of a community.

Learning is responsive to practical needs. Most working environments, as a rule, develop the skills and knowledge they require. In a rural economy, skills are handed down from father to son. Training is a process of observation and practice; subsistence farmers may be well trained for subsistence farming, but not for much else. In modern sector agriculture, farmers and workers are given specific instruction and supervision (training) in use of fertilizers, insecticides, water use, planting, harvesting, or handling of crops. In this case, learning is more likely to be based upon the knowledge of farm managers, extension agents, or extensive research and experimentation. In a modern metal fabrication plant or textile mill, specialized on-the-job training is provided for operators, and nearly all of the craftsmen and technicians acquire their skills through in-service training. The automobile mechanics in Nigeria and other African countries learn their trade in small garages or in the larger service shops of the car manufacturers. Only an insignificant few ever learn to become auto mechanics in formal vocational schools. In many of the developing countries, the training of personnel to operate complicated oil refineries, chemical plants, or steel mills has been remarkably rapid and effective. Engineers with a professional education learn their specific tasks quickly; operators, who may have the equivalent of secondary school general education, are trained on the job. And managers and top administrators are in effect "grown through experience and service" in employment. In sum, the working environment, with its farms, factories, ministries, mines, garages, and repair shops, is a vast generator of skills and knowledge which may be of equal, if not greater, significance than the entire system of formal schooling.

A review of the learning generating capacity of working environments should encompass the following:

1. Access to working environments

Who is employed by the principal employing institutions, in both the modern, intermediate, and traditional sectors? What are the major "ports of entry" into employment?

What pre-employment education or skills do they possess? What are the essential prerequisites?

What types of persons with what skills, and at what wages do employing institutions prefer to hire?

2. Orientation of learning

What do people learn in the process of working?

What kinds of formal training are provided by various employing institutions?

What are the objectives of employing institutions in training workers?

3. Constrairts

What kinds of skills cannot be developed "on-the-job"?

What are the human and financial constraints preventing less than optimal training in employment?

What incentives could be used to increase and improve training in the working environment?

4. Efficiency

In what respects are activities of employing institutions hampered or prevented by inability to develop skilled manpower?

What categories of personnel must be sent abroad for training? How effective are these arrangements?

What are trade-offs in terms of wages in hiring highly trained persons vs. hiring lesser trained persons and developing their skills on-the-job?

A systematic evaluation of the learning generation capacity of working environments is a much superior analytical tool than the usual high-level manpower survey. Manpower demand is expressed more realistically in terms of trainable rather than fully trained workers. The arbitrary and misleading assumption that the formal education system can produce trained

persons like so many bars of soap is rejected. The concept of continuous learning throughout one's working life is reinforced, and attention is directed to understanding the processes of learning and their interrelationships.

Finally, we are convinced that many countries are led to overinvest in formal education and particularly in pre-employment and vocational and technical training, because they underestimate the learning-generating capacity of working environments and employing institutions. For this reason, we submit that their analysis should be the starting point rather than an ancillary consideration in an overall assessment of nation-wide learning services.

4. The Role of Formal Education in Learning Systems: As indicated in Appendix I, most education sector assessments start and end with a study and analysis of age-specific formal education. Since the literature is full of check lists for looking at formal education systems, very little need be added here.

Most countries view formal education from the perspective of social demand as well as economic growth. The Ethiopian Sector Review is a good case in point. From one perspective it states, "Education has the prime responsibility of contributing to the earning capacity of the individual and the economic betterment of the country." From the social demand perspective, a "fundamental purpose...should be to equip each citizen with the minimum education necessary for him to function and contribute positively and intelligently in his community and the wider society of the nation." In the Ethiopian exercise, secondary and higher education are geared to national needs and goals, while first-level is viewed from the perspective of social objectives. In both, equality of opportunity, particularly for

rural dwellers, is a major goal.[11]

The typical formal education review estimates enrollments, outputs and dropouts in all three levels; enrollment ratios by major areas or regions (rural vs. urban, etc.); numbers of teachers and their qualifications; pupil-teacher ratios; and unit costs for various levels and kinds of schooling. Most place great emphasis on teacher training institutions and their strengths and weaknesses. Nearly all discuss in considerable detail, but not necessarily with quantitative specification, the unrealistic orientation of formal education in relationship to needs; many touch upon possible uses of new technologies; and nearly all are concerned with matters of the internal efficiency of the formal schooling system.

Here again, sector analysis should be concentrated in four main areas:

1. Access

   At each level, who gains access to formal school, and more important, what groups are denied access and for what reason? This is a vital consideration no matter what perspective is involved.

2. Orientation

   What are the major aims of various levels and kinds of formal education? Are they to prepare persons for more formal education? Are they designed to prepare people for participation in the labor force? Does the curriculum involve rote learning or problem solving? These are all obvious questions that are found on the agenda of formal education surveys.

3. Constraints

   What are the limits, financial and human, to expansion and improvement of formal education? How rapidly can access to education be extended to presently excluded groups? How can the financial burdens of education best be allocated? These are economic questions which demand in-depth consideration in a sector review.

4. Internal Efficiency

   What are the wastage and drop-out rates and what are the reasons? To what extent can efficiency be increased through better organization, management, technology, and teacher utilization? What are some of the possible restraints on "the iron law" of rising costs of education?

All of the above questions are familiar to educational planners. A major concern is not what to look at but rather the pervasive lack of adequate data. Yet, in this area, data are better than in the case of nonformal education and learning generation in working environments, and, as shown later, fairly sophisticated quantitative analysis may be appropriate.

5. The Role of Nonformal Education and Training: It is now widely recognized that a simple review of a country's formal schooling system provides only a partial and quite inadequate analysis of its system of human resource development. For this reason, planners have become more aware of "nonformal education." But this is difficult to define. In the broadest sense, nonformal education and training encompasses the entire range of learning processes and experiences outside the regular graded school system. Thus, it includes everything from learning from parents, communication with others, and learning from experience to formal training on-the-job, apprenticeship, adult education, and participation in organized out-of-school programs such as youth brigades, extension services, community development projects, and health and family-planning clinics. Probably no country has ever made a complete inventory of all nonformal learning programs conducted by its many public and private agencies; there are no reliable estimates of either capital or recurrent expenditures allocated to them. However, in the aggregate, probably more people are exposed to nonformal learning activities than to formal schooling. And, as a continuing process of development of skills, knowledge, and capacities of the labor force, nonformal learning and training is certainly of equal importance to formal education.

Strictly speaking, learning opportunities generated by employing institutions fall within the overall definition of nonformal education but, in order to emphasize their particular importance, they have been treated

separately. Suffice it to say, however, that many kinds of nonformal education may be an alternative or substitute for formal schooling; they may be a means of extending skills and knowledge gained in formal education; in some countries they may offer the only available learning opportunity for large proportions of the population; they can be a means of counterbalancing some of the distortions created by the formal education system; and finally, in part because of their heterogeneity and decentralized control, nonformal education activities often provide unique opportunities for innovations in the nation-wide learning system.

Logically, it would be desirable for every country to make a complete inventory of all nonformal education, to evaluate the usefulness of each separate activity, to plan extension and improvement of the most promising programs, and above all to build a strategy for their integration into a more consistent and better functioning system. The formulation of such a strategy, however, is no easy task. The activities are many and diverse, and responsibility for their operation is highly decentralized. The best procedure is probably to concentrate on a relatively small number of "leverage points" or programs where concentrated effort might have the highest pay-offs. Some suggested leverage points are adult literacy programs, work-oriented literacy projects, farmer training centers, village polytechnics, mobile craft training programs, urban skills centers closely associated with employing institutions, nutrition and health centers and family-planning clinics. These and other important programs may be operated by private groups or public agencies; they may be locally initiated or centrally sponsored. Many spring up in spontaneous response to needs and simply await discovery by master planners. Here again we suggest analysis under the four basic headings: access, orientation, constraints, and internal efficiency. In examining them, the following questions

deserve high-priority consideration:

1. In what important areas can nonformal programs fulfill education and training needs which formal schooling is unable to provide?

2. Are nonformal programs, because of their flexibility in comparison with the rigidities of formal education, more susceptible to innovation in the learning process?

3. In what ways do innovations in nonformal education and training induce desirable innovations in the formal schooling system?

4. In what areas do nonformal activities provide more effective learning, or learning at lower costs, than alternative programs in the formal education system?

The literature on nonformal education is still meager. There are a few recent and to-be-published works which deserve mention. Sheffield and Diejomaoh made a series of case reports on nonformal education in Africa in 1971.[12] A very comprehensive and analytical study, Nonformal Education for Rural Development, was made for the World Bank in 1972 by Philip Coombs and his associates in the International Council for Educational Development which will probably be available from the World Bank late in 1973. Another review of experience, pertaining especially to Southeast Asian countries, has been carried out by Cole Brembeck and Timothy Thompson.[13]

6. Critical Choices and Alternatives: The heart of any good assessment of a nation-wide learning system is the examination of alternative combinations of available or potential learning services. In this paper, we divided them into three broad categories: those generated by working environments and employing institutions; those provided by the system of formal schooling; and those offered by the more important organized nonformal education and training programs. All three perform strategic functions. But how can one determine the most appropriate mix of programs, the highest quality and lowest cost combinations, and thus the most effective strategy for overall development of the nation-wide learning system? To what extent in the

sector approach must one rely on intuitive or qualitative judgment? In what areas are rigorous quantitative analyses feasible? These are questions to be considered in this and the following section.

The critical choices to be made within the formal education system are perhaps the most widely recognized. For example, in expanding access to first-level education, is it better to provide a minimal program of four to five years for a larger number of children than perhaps six to eight years for a smaller number? Is it better to opt for large numbers of teachers with little formal education (perhaps eight or nine years) or to rely on higher paid teachers with longer pre-employment training? In allocating resources for education, what are the appropriate shares which should go to primary, secondary and higher?

The rural development planner faces another set of alternatives. Given finite resources, what emphasis should be given to agricultural extension, farmer training classes, or multiple-purpose rural training centers which may provide programs in nutrition, health, home-making, rural crafts and functional literacy in addition to farming techniques? And within the vast array of other nonformal education activities, what are the best choices between radio and television programs, traditional literacy classes, and functionally oriented community development projects? In many countries it may be possible to estimate the costs of these various programs; studies of their relative effectiveness are at least in the beginning stages. The most perplexing problem in all cases, however, is the difficulty of evaluating the outputs of these various programs. Here simple quantitative measure is meaningless, and qualitative differences must be distinguished largely by informed judgment.

There are also critical choices in improving the learning services of the employing institutions. Will taxes or subsidies induce large employers to offer better training opportunities? Are "training pools", such as the payroll-tax financed training provided by SENA or comparable Latin American institutions, the most feasible method of extending services to small and medium-sized enterprises? Will technical assistance to small proprietors improve the operation of indigenous apprenticeship systems, or would they do just as well if left alone? Most education sector reviews have given little or no consideration to this range of questions.

The choice between the three broad categories of learning services, however, is more difficult, yet often more fundamental, than the choices within them. Here are some examples:

Skilled craftsmen such as electricians, carpenters, masons, fitters, and automobile mechanics may be trained in employment either through apprenticeship arrangements or by less formal means of gaining experience on the job. But they may also learn their trade in formal vocational schools. Automobile mechanics may be taken as a case in point. In the developing countries, most young people learn this trade as apprentices in small garages and shops. This indigenous training system might be improved by organizing extension services for the garage owners, or by off-duty training classes in the principal towns and cities. Another alternative might be to induce the major distributors of cars and trucks, which usually have the best facilities for producing mechanics, to train a surplus beyond their own needs. Pre-employment formal training in vocational schools is the other alternative, but probably in most cases the most expensive and least effective. A good sector review should weigh carefully the alternative processes of training such skilled craftsmen and suggest those combinations most likely to develop the

quality of craftsmen needed in the shortest time and at the least expense. In many cases, the logical choice would be to rely heavily on employing institutions to subsidize on-the-job training programs and to de-emphasize, if not forego completely, the formal vocational schools.

The training of senior technicians is another area for serious consideration. Technicians are persons whose skills are highly specialized to particular working environments. Most of their training must be in employment. Often a technician must be sent abroad for short periods to learn the technology of a particular industry, process, or complex of equipment. It is ridiculous to assume that a formal school or institute can produce a full-blown standardized technician for "industry" in the developing countries. In most cases, technical trainees in the polytechnic institutions must be sponsored by particular employers, and courses of instruction must be specialized to meet the requirements of the sponsoring organization. Here again, a proper assessment would carefully evaluate the capacity of employers to train technicians and the extent to which pre-employment education in formal schools is either required or relevant.

The training of nurses and medical technicians is another example where attention must first be directed to the role of employing institutions. For the most part, para-medical personnel are trained in hospitals or clinics rather than in a school classroom. Another related question is whether physicians must receive their clinical training in expensive teaching hospitals associated with the universities or in rural hospitals and medical stations.

Finally, there is the crucial question of developing managers and administrators. Such persons certainly cannot be prefabricated in schools of business or university courses in public administration. They can obtain a good deal of relevant education before employment, but then leadership and

managerial skills are developed in the crucible of practical experience. Staff training courses for those already employed are useful as stimulants to learning, as are refresher courses in relevant engineering and scientific fields. Here again, we argue that skill and knowledge generation in the modern sectors of developing countries is not a matter of educating a pre-determined number of persons to fill an estimated number of occupational slots, but rather a continuous process of human resource development centering upon the dynamic imperatives of employing institutions.

Many more examples of critical choices among alternatives could be presented. In any developing country, the range of such choices are wide, and the logical selection of the best alternatives is the key to effective human resource development planning. It is impossible to write an instructional manual for making such choices. Nevertheless, some broad procedural steps may be suggested.

First, the capacity as well as the limitations of working environments and employing institutions for developing human resources should be evaluated carefully. The focus should be on processes of learning, the nature of inputs (pre-employment education, training, and experience) at the more important ports of entry into employment, and the opportunities for improvement of learning processes within working environments. In many countries the large expatriate enterprises are even more vital than formal schooling in developing strategic skills, particularly for modern-sector development. In any case, the working environment survey should be a prerequisite for assessment of the formal education system, and it will also eliminate the need for specialized high- and medium-level manpower surveys.

Second, to the extent that national development needs or employment generation are selected as perspectives for analysis, the formal education

system should be evaluated in terms of its outputs of trainable people for entry into the labor market at the principal ports of access. A guiding principle should be that of comparative advantage. Specific training which can best be provided by employing institutions should be removed from formal education. The latter should concentrate on basic education, the building of cognitive skills, and pre-vocational education which cannot be provided efficiently by employing institutions.

Third, the possibilities of organized, nonformal programs should be explored as alternatives for or supplements to formal education. And here particular attention should be given to the provision of some kind of learning opportunity to the vast majority of the adult population who may have been deprived of access to any kind of formal education.

The approach suggested above in no way downgrades the importance of formal education. On the contrary, by concentrating initially on the learning opportunities provided by working environments, it defines more sharply the essential functions and comparative advantage of formal schooling. The substitution of the concept of universal learning opportunity for the narrower goal of universal primary education for children offers greater hope for the masses to participate in national development. And it buries the notion that persons lacking formal schooling in childhood must be forever denied meaningful learning opportunities. Facts, figures, and judgment, however, are required for wise choices, and these are discussed in greater detail in the following section.

7. The Need for and Limitations of Quantitative Analysis: Many economists argue that sophisticated economic planning must be based upon rigorous quantitative analysis. The quantitative sector analysis approach is being applied

quite successfully in agriculture[14] and in industry where inputs and outputs are subject to quantitative specification and where the techniques of input-output analysis, linear programming and other econometric apparatus can be usefully employed. The hope is that similar techniques may be applicable in assessments of nation-wide learning systems.

The inputs of formal education as well as many nonformal training activities can be measured in quantitative terms. Unit costs of various levels of education can be specified, as can teacher salaries for various levels of training. Drop-outs are easily quantified; participation rates of various age groups in schooling are available in many countries. Capital expenditures and costs of materials can be estimated. Therefore, it is possible to construct models which clarify relationships between levels and types of education programs and various choices of inputs. A good example is An Asian Model of Educational Development, developed by UNESCO in 1965.[15] This study presents a methodology for quantifying various hypotheses commonly considered by formal education planners to demonstrate the cost consequences of different combinations of measurable inputs. Modifications of this method have been employed usefully in a number of individual countries.

The inputs of nonformal education and the inputs of employing institutions in providing learning opportunities are more difficult to specify. For example, some employers incur measurable expenses in operating an organized training program, but most learning opportunities may be the consequence of normal operations where it is impossible to separate training from production costs. The costs of organized programs such as adult-literacy and farmer-training centers, of course, are quantifiable, though hard data are usually more difficult to find than in the case of formal education. But in all of these activities, the outputs again defy rigorous quantification,

at least on the basis of the kind of data which are likely to be available in the next decade or two.

Without question, therefore, much emphasis can and should be given to quantitative measurement of inputs and costs. This can provide a good basis for estimating the financial feasibility of alternative choices, and may throw light on how much learning a country can buy at specified levels of GNP and public expenditure. Through rigorous quantitative analysis one may examine, for example, the feasibility of providing universal primary education within a specified time period, the cost-consequences of improving the quality of teachers in terms of their pre-employment formal education, the relevant choices in terms of allocation of resources for varying levels of expansion of secondary and higher education, and, in many cases, comparative outlays for major nonformal education programs in terms of numbers of persons served. Here again, the Ethiopian Education Sector Review is a good example of systematic analysis of costs of different strategies of program development.

Perhaps the best basic treatment of quantitative analysis of education systems is the book by Russell Davis entitled Educational Models and Schemata.[16] Davis' review of the applicability of quantitative analysis in education planning made for OECD in 1972 is also an excellent reference.[17] Davis and other colleagues at the Harvard Center for Studies in Education and Development are currently engaged in further research on the frontiers of knowledge in this area.

Although quantitative methods can be applied quite successfully in analysis of inputs and costs of learning services, they are much less useful in measuring outputs. The outputs of learning services are difficult to standardize. For example, the number of primary, secondary, or third-level

graduates may be determined, but the quality of their education, its relevance to working environments, and its general orientation to the needs of a country are difficult to express in quantitative terms. Nor can one determine whether the system is producing good or bad engineers, doctors, or scientists, or turning out employable or unemployable secondary school leavers. Tests can be devised to measure cognitive skills, but they are of little use in measuring effectiveness of orientation of formal schooling to working environments. A skill produced in formal education, furthermore, is not stable. It may change, grow, or depreciate in the working environment. Outputs of educational systems are quite unlike other outputs such as bushels of corn, bags of rice, head of cattle, or bottles of beer. Since outputs can be specified in only the most general and imprecise terms, production functions for formal education may be quite misleading. The quality and orientation of learning services are thus likely to remain for some time in the realm of intuitive judgment.

In short, rigorous quantitative analysis should be used to the maximum extent possible in the sector approach. In particular, it is appropriate for measuring inputs and costs. But informal judgment and non-quantitative appraisals are likewise required, especially in examining the outputs of learning services. Quantitative and qualitative analyses can be employed effectively in combination. Unfortunately, there is no elegant mathematical formula for allocating resources to learning service, but this in no way implies that the analysis needs to be superficial or purely impressionistic.

8. Organization for Implementation: As already indicated, sector assessments are beset by formidable methodological and data problems. But even these are eclipsed by difficulties of organizing the assessment effort,

formulating a strategy, and implementing a program for development of learning services. It is obvious that the assessment must go beyond formal education itself, and this means that it must involve many government agencies in addition to the ministry of education. For example, the ministries of agriculture, labor, industry and commerce, community development, health, and others usually operate training programs in specialized fields. Private enterprises and public agencies as employers are strategically involved in human resource development. A sector-wide learning system approach, therefore, calls for inputs from a consortium of concerned agencies. The planning organization, if one exists, may organize the task, but many surveys will have to be undertaken by the operating agencies themselves.

In some cases, ministries of education have opposed learning service assessments which transcend the boundaries of the formal schooling establishment. Agriculture ministries may be hesitant to share prerogatives with educationists or health officials. Private enterprise favors a minimum involvement of government bureaucracies. Thus, leadership and, indeed, pressure must come from the highest echelons in government--usually at the prime-ministerial or presidential level--to overcome resistance to the idea of a comprehensive and objective review. Even more important is leadership in implementing a strategy and program which is bound to call for diversion of resources and transfer of tasks from one ministry to another and usually involve significant changes in lines of authority, particularly in local districts or provinces. In short, the building of a nation-wide learning system is a disturbing exercise; it generates insecurity and threatens vested interests. True, everyone may be in favor of the principle of building a comprehensive learning system but, in practice, there are strong forces committed to maintaining the status quo.

The organization of the assessment effort is primarily a decision for the government. An assessment is bound to raise thorny political issues within the country. The pitfalls for an external organization wishing to "sell" a sector assessment are obvious. In this area, there are no mechanical devices, sophisticated methodologies, or even "rules of thumb" for guidance.

9. Review and Evaluation - "Recurrent Sector-Wide Assessment": In the past, both governments and aid-giving organizations tended to view manpower surveys and sector assessments as rather elaborate "one-shot" projects. It was thought that a good study would provide policy guidelines for years to come. This has proven to be a misleading notion because developing countries are undergoing dynamic change. An initial sector review and analysis can perform a number of functions. It can provide an overview of the nation-wide learning system; it can identify available policy choices; it can formulate a logical strategy; and it may outline an initial program of action. It should also specify areas of critically needed research and investigation. Yet, in reality, the initial assessment should be considered only as the first step in a continuous annual review and reappraisal of the operation and potential of a country's learning system.

10. Priorities and Organization for Research: The final element in considering sector assessments is research. The returns to research on various aspects of learning services are likely to be greater following an initial sector assessment than before it is undertaken. The assessment is useful in pinpointing the areas for needed data; it provides the benchmarks for determining the relevance of various kinds of investigations and it serves to activate and channel the energies of research organizations. Sector

studies and analyses need not wait upon availability of data, but rather should serve as instruments for determining research priorities.

Obviously, it is impossible to specify research priorities except as related to conditions in specific countries. However, some areas of high priority for most countries can be identified.

1. The means of evaluating and quantifying outputs of the learning system is unquestionably of highest priority, as mentioned repeatedly throughout this paper.

2. Evaluation of processes of learning generation in working environments is definitely an under-researched area, and demands much greater effort.

3. Learning technologies and their application in developing countries are important, and considerable research in the area is already in process.

4. Both inputs, outputs, and objectives of nonformal education need more rigorous investigation, and here also major studies are in progress, sponsored by the World Bank, U.S. AID, the African-American Institute, and other organizations.[18]

5. The institution of "tracer studies" probably warrants very high priority in all countries. Since there is some confusion about these and the state of their development, a brief description is presented in the Appendix.

6. Basic studies of investment in all kinds of learning services and their effect on income distribution would appear to be of critical importance. Some of the central questions are these: does formal education, particularly at the secondary and higher levels, benefit the poor, thus exerting an equalizing effect on income distribution? Or does it benefit predominantly the already privileged, thus favoring the rich and thereby widening income disparities? What kinds of learning services and what types of formal education widen income disparities? What programs benefit mostly the poor and the underprivileged? What measures are available to enable learning services to reduce income disparities while, at the same time, promoting greater productivity, better utilization of human resources, and economic growth?

Many other significant research priorities will become obvious from the outgrowth of sector reviews in various countries. Indeed, the need for studies will almost certainly outpace the capacity for undertaking them.

The organization and implementation of research activity is also important. Some investigations, obviously, are best undertaken by the staffs of the concerned ministries. Others may be more appropriate for detached outsiders, particularly in areas where intra-government biases are involved. Universities in the developing countries have great potential for research, and in many cases their resources are underutilized. Their involvement, and that of university students, may yield high pay-offs in furthering understanding and interest in nation-wide development planning. And their strength as research institutions can often be augmented by collaborative arrangements with university research organizations in other nations.

## III. CONCLUSIONS

In its most advanced form the sector approach to analysis of nation-wide learning services is a means of viewing all aspects of national development from the perspective of human resources. It rejects the notion that there is a self-contained, compartmentalized sector called formal schooling. Learning services and opportunities are vectors of every sector in the economy, and they play a critical role in every process of national development. Thus, in this paper, we have looked at development from a "human angle".[19]

The sector approach may be narrowly focused or broadly based. Narrowly focused approaches usually concentrate on formal education. The comprehensive approach includes, in addition to formal education, consideration of nonformal education and training programs as well as learning generation functions provided by the working environment and employing institutions. The argument in this paper favors the broader approach, and it stresses the importance of continuous or recurrent sector review and assessment.

The problems inherent in the sector approach are political, organizational, and methodological. There is no simple formula for analysis of education and learning systems. The sector approach requires the collaboration of persons with practical experience in identifying critical problems and imaginative model-builders with expertise in manipulating data. The practical-experience expert, working by himself, is likely to come up with methodologies based on "more of the same". The econometric model-builder, by himself, is likely to by-pass many of the critical decision-making elements as he specifies his assumptions. Progress is most likely to result from joint efforts of the two, the experience-expert suggesting the high-priority problems for solution and the theoretician suggesting new approaches in analytical design.

Lack of data is always a problem and leads some experts to question the feasibility of attempting comprehensive reviews of nation-wide learning systems. It is futile, so they say, to undertake such projects until there are better statistics. Our argument is that such assessments are prerequisites for building an effective data collection system. In the beginning, an overview of a country's learning system may have to be superficial, but it is likely to provide a better sense of direction than exhaustive analysis of a single part of that system, such as, for example, age-specific formal schooling. In exploring new terrain, one is blazing new trails rather than traveling on highways paved with hard data. The process of "recurrent assessment" stressed in this paper is an effective means for new discovery as well as for accumulation of relevant data.

There is a reasonable amount of information, case experience, and general literature available for study by those who may want to initiate sector studies and analyses. Methodologies for quantification of inputs

are available. The critical problems can be identified. Thus, it would be possible to offer seminars or short courses on the sector approach using discussion leaders from various countries which have had some experience. Furthermore, some research is now being directed toward quantification of outputs of various kinds of learning services. Finally, joint working parties of practical experience experts and model-building experts might be able to suggest more sophisticated methodologies for both quantitative and qualitative assessment of nation-wide learning services. In short, the sector approach to education and learning systems is new, but may be more widely used in the seventies. And this new interest can and will generate better methodologies and more sophisticated means of solving the practical problems which are inherent in the process.

## APPENDIX: SOME METHODS OF EDUCATIONAL SECTOR ANALYSIS

A discussion of the many techniques and approaches for analysis of education and learning systems could fill several volumes, and certainly lies far beyond the scope of this paper. In this Appendix we present some brief comments on three rather widely recognized approaches: 1. manpower surveys; 2. returns to investment in education; 3. tracer studies.

1. The Manpower Requirements Approach to Education Planning: During the sixties the major thrust of manpower analysis has been directed to determination of future requirements for formal education, particularly at the secondary and higher levels. In essence, the manpower requirements approach to education planning is an attempt to estimate needed educational outputs from a set of projections of economic growth forecasts or targets. These are used to determine output and employment in the various sectors of the economy. From the distribution of employment sector, an occupational

distribution is then specified. Assumptions are then made concerning appropriate levels of formal education for each occupation. Estimates of the required number of persons by education level are then used in conjunction with data on existing employment, expected retirements and replacements, and new net requirements to meet expected expansion. The manpower requirement approach has been used rather extensively in Nigeria, Zambia, Tanzania, Kenya, and in the so-called Mediterranean Regional Project Countries (Turkey, Spain, Yugoslavia, Greece, and Portugal). A summary of my analysis of this appraoch in a previous work follows.[20]

There is no generally accepted methodology for estimating future requirements. Nor is there a clear concept of the meaning of the term "future requirements." Some people talk about "predicting" or "forecasting" manpower requirements; others contend that they are making "projections." And still others emphasize the process of forward "target-setting"

A rather simple method of estimating future requirements is to ask existing establishments to specify them. This will provide an informed judgment of short-term requirements, but it is quite unreliable for long-run estimates. The establishments which may be in existence ten or twenty years hence may not be at all the same as the present ones. Furthermore, most employers are unwilling or unable to estimate what employment will be in the long run. As one exasperated owner of a business in Jordan is reported as saying, "Such guessing is an impious act, for only Allah knows what the future may hold." For these reasons, we consider that forecasts made by individual establishments are essentially part of an assessment of the present situation rather than a practical means of making long-run estimates.

Another method is to use past trends as a means of projecting future requirements.[21] This method has been used in some advanced countries to

estimate needs for high-level scientific and engineering manpower as well as for teachers. The procedure is to extrapolate past trends in the growth of the number of persons in the particular occupation and then correlate this with total employment, production, population, gross national product, or some combination of such variables. The regression table thus obtained is then used to project future requirements for each occupation. This projection method has the advantage of simplicity, but its usefulness is limited. In many countries it is impossible to get past data for an adequate time series. And even where the data may be available, the assumption that future relationships can be derived from past trends is open to question.

A more complicated method is based upon the estimation of changes in productivity as the critical factor. The steps in this approach are the following.[22]

1. A manpower inventory is made along the lines which were described earlier.

2. The patterns of output for the various sectors of the economy are projected for the forecast year, usually as set forth in an economic-development plan. Then total employment for the economy as well as for each sector is estimated on the basis of some assumptions about productivity.

3. For each sector, the total employment for the forecast year is allocated among the various occupations according to the occupational classification system which has been chosen. Then the requirements for each occupational category are aggregated from the various sectors to give the total stocks required in the forecast year. Here, however, allowance must be made for the effects of increases in productivity on the occupational structure. As productivity increases, of course, the proportion of persons in high-level occupations increases relative to those in the lesser skilled jobs. In

practice, however, one must have assumptions regarding the influence of productivity increases on occupational structure since there are very little reliable data on which to base objective calculations.

4. The supply of personnel with each major type of educational qualification is estimated for the forecast year on the basis of present stocks, anticipated outflows from the existing educational system as presently planned, and allowances for losses due to death, retirement, and other reasons for withdrawal from the labor force.

5. The estimated outputs from the educational system are compared with the required outputs as determined in step 4.

6. The orders of magnitude for expansion of the educational system are then established to close the gap between anticipated requirements and presently expected supply.

This method, perhaps, has the greatest appeal to economic-development planners, and, with modifications, it has been used by most of the countries in the Mediterranean Regional Project. It links manpower requirements to productivity; it is designed to identify high-level manpower bottlenecks which could hamper production; and thus it appears logically to relate human resources needs to economic requirements.

This approach, however, has some shortcomings. First, although the productivity criterion may be appropriate for the manufacturing, construction, mining, and transportation sectors, it is not so useful for estimating high-level manpower requirements in public health, general activities of governments, and many kinds of services.

Second, a very troublesome problem is the lack of empirical data on which to base estimates of expected increases in productivity and the bearing of these on changes in occupational requirements. In practice, one

can do little more here than to make general assumptions. For example, one may assume that in the forecast year the average productivity of all factories in a particular sector will equal the present productivity of the most modern ones. Or one can assume that average productivity of the manufacturing sector in Country A in the forecast year will approximate present productivity of a comparable sector in Country B, which is somewhat more advanced.[23]

A third problem which is inherent in this approach as well as in most others is the arbitrary determination (on the basis of assumptions) of educational requirements of high-level manpower for the forecast year. In very few cases are there precise or binding relationships between jobs and educational attainment. Indeed, in any occupational category, there may be a wide possible range of substitution among persons with various levels and kinds of education and training. In many cases, moreover, the demand for persons with particular levels of education may be dependent upon the available supply.

A final major shortcoming is that wages and salaries are not specified. Clearly, no realistic assessment of supply and demand for persons in critical occupations can be made without consideration of relative levels of compensation. Thus, the manpower requirements approach really projects only "needs" or targets for what is thought to be a desirable output of educational institutions. This is quite different from "effective demand," or actual expected employment of persons at stated wage and salary levels.

The "track record" of the manpower requirements approach has not been impressive. In most cases countries have become submerged in data collection and analysis problems, and as a result many manpower assessments are out of date before they are finished. Powerful ministries are likely to ignore or even block publication of reports which appear to be at odds with

established policy. The personnel engaged in manpower assessments are often looked upon as "statistics chasers" rather than policy planners. For the most part, therefore, estimations of manpower requirements have had little practical impact on education planning except in a few countries. The manpower assessments in Tanzania, however, are a notable exception. Though not technically as sophisticated as recent surveys in some other countries, they have been more current, and above all they have been used as the basis for education planning as well as allocating bursaries for students entering higher education. If the dual criteria of practical design and operational usefulness are accepted, the Tanzania surveys are without question the best that have been developed in the African countries if not in the entire Third World.

2. The Calculation of Returns on Investment in Education: Many economists are critical of the manpower requirements approach to education and have advocated the more sophisticated system of cost-benefit analysis. Basically, this approach calculates "returns on investment" in education by estimating the differentials in life-time earnings of persons with different levels of education and relating these to costs of education to get the rate of return. In theory, the planner could be guided by rates of return in recommending the allocation of resources to various levels or types of education. Cost-benefit studies of this kind have been attempted in several developing countries. Perhaps the best overall treatment is provided by Samuel Bowles.[24] There have also been a number of studies done on individual cases.[25]

There are, however, many difficulties with this approach. The first is inadequate data. Although statistics on costs of education are relatively easy to collect, those for life-time earnings are not. They must be estimated from current or past census data. Differentials in earnings are also

attributable to many factors other than level of pre-employment education. Another questionable assumption is that differences in earnings are a good indicator of differences in productivity or usefulness to society. In developing countries, earnings often reflect wage and salary structures based upon institutional factors such as tradition, class, or previous colonial heritage. The calculation of social returns, for example, should be based upon more than income. Obviously, a scientist who works in a research organization which is applying scientific knowledge to development problems would be valued more highly than a university graduate who performs routine duties in a ministry, despite the fact that both may receive approximately the same salary. Or, although his salary may be substantially lower, the agricultural assistant who teaches hundreds of farmers the arts of seed selection and modern cultivation methods may be more valuable than the agronomist who shuffles papers in the ministry headquarters. And how would one evaluate the services of a physician whose practice is largely among high-salaried expatriates as compared with the public health doctor who directly or indirectly ministers to the masses? In most developing countries returns to individuals on investment in higher levels of education are quite high, whereas the social returns may be relatively low or even negative. This results in expansion of demand for education which may be very poorly geared to development needs.[26]

The rate of return approach, moreover, has a narrow economic perspective. It ignores the function of education as a selection device, as a means of building consensus, as a process of enrichment of human life, and as an instrument for developing strategic skills and knowledge. Income is certainly not a good measurement for any of these central functions of education. Economists may claim, with some justification, that such intangibles

are not their business; nevertheless, those charged with responsibility for broadly-based national development must weigh them carefully.

Finally, even within the narrow boundaries of responsibility of the economist, the rate of return approach tends to bypass the critical issues of income and opportunity distribution. In looking at this as well as his own model, Bowles reluctantly concludes:

> This shortcoming is important because we desire social justice as well as a large gross national product, and there is no reason to expect that the pattern of educational development which maximizes the rate of economic growth will at the same time generate an equitable distribution of income.[27]

Despite its many shortcomings and pitfalls, cost-benefit analysis of economic returns to education can serve useful purposes. If, as suggested above, such analysis shows that individual rates of return are greater than social returns, then there is a logical argument for making individuals pay for more of the cost of their education. Thus, cost-benefit analysis may be useful in determining how the costs of learning services should be allocated. And even if the benefits cannot be measured realistically in non-economic terms, the analysis of costs per se is a vital part of any plan of human resource development.

3. Tracer Studies: This idea is suggested by the bullet which traces its path from the firing point to the target. It is nothing more nor less than a system for following the work experience of those who leave or complete programs of education or training, either formal or informal. Admittedly, such follow-up studies are difficult and expensive, but the returns, in terms of effective project evaluation and feedback to skill and knowledge generating institutions, are potentially very great.

The objective of most tracer studies has been to collect data on how secondary school or university graduates get jobs, how long they take to

find work, their levels of compensation, relevance of previous education to work experience, and career pathways in general. They can provide information on the linkages between education and the world of work; they give in-depth data on unemployment or underemployment of educated manpower, and are useful in supplying hard facts for vocational counseling. An initial pilot tracer study in Kenya illustrates some of the questions which may be raised about projects of this kind.

In 1969, the Institute for Development Studies (IDS) at the University of Nairobi conducted a pilot tracer study of fourth form secondary schools in Kenya. A small team of researchers at IDS worked in collaboration with the headmasters and careermasters in the selected schools. The basic tracing instrument was a simple card file for each leaver on which was recorded basic facts from school records about each student's family background and educational history. The post-school employment tracing process was first attempted by mail questionnaires. Students not located in this way were traced by a variety of procedures, including questioning of friends still in school, parents, and others who could supply information about their whereabouts. Eventually, project personnel were assigned to search out the missing leavers in person. Within a very short time, the research team was able to trace 93 percent of the leavers from the sample schools. Once traced, the leavers were asked to supply information concerning their occupation, pay, method and time of finding employment, and other relevant questions. In some cases, employers were also asked for supplementary information.

Experience with the pilot study in Kenya indicates that:

1. Most school leavers can be traced to their places of employment, but follow-up personal interviews are necessary to supplement mail questionnaires.

2. Information about work experience and conditions of employment can be secured easily, but analysis of the data collected involved more time and expense than originally estimated.

3. School headmasters and careermasters are eager to make use of the information received on employment experience and career pathways.

4. Estimates of unemployed school leavers derived from the tracer studies were at variance with estimates derived from a Kenya manpower survey (the employment rate being much lower in the case of the tracer studies).

5. Schools, and probably also universities, will require inducements, either in the form of grants or extra personnel, to undertake tracer studies.

The tracer study device probably could be generalized and systematized in most countries. A first step would be a requirement that every major institution conducting education or training programs establish a simple but standardized system for tracing their outputs for a period of from two to five years. Placing the responsibility for tracing on the education or training institution would constitute in itself an important means of building better linkages between the learning system and the system of employment generation. It would make the institutions more sensitive to employment and possibly lead to more realistic orientation of the curricula to the world of work, and enable them to carry out more effective counseling and guidance services for their students.

The tracer study idea, of course, is not new. Many researchers have made follow-up studies of students in education and training programs; indeed, that would be required in any serious exercise of project evaluation. But most follow-up studies are too elaborate, complicated, and expensive to be undertaken by already overworked headmasters or directors of training programs. The primary considerations for a generalized tracer system would be simplicity of administration, ease of collecting information, and capability of analysis by relatively unskilled persons without use of complicated data processing systems. The design of such a program, however, would require a great deal of experimentation and systematic research.

There are other possible ways of establishing a generalized tracer system. For example, in Kenya a proposal is under consideration to combine the tracer idea with the annual labor force enumeration by employers. Under this scheme, each school or university leaver would be assigned a serial number coded to identify the school, courses of study, grades and years of attendance. The leaver would keep this serial number for his working life, and his employer would be required to record it on all returns made on the annual enumeration. With this procedure the pre-employment school record of each employee with secondary education and above could be traced easily. Reports on post-school employment could be made to headmasters, careermasters, or university officials for all leavers. As information of this kind is accumulated each year, there would be a complete individual record of changes in occupation, pay, promotion, and transfer. In other words, a complete tracing of career pathways. The information collected could also be used by research organizations for making cost-effectiveness studies, identifying major shifts in employment patterns, estimating manpower supply and demand, and developing materials for guidance purposes. This scheme, moreover, might eliminate the necessity of making periodic manpower surveys by substituting a procedure which in effect would be a continuous process of assessment of the market for middle- and high-level manpower in relationship to the educational system. There are, however, some drawbacks and knotty questions. The scheme is more appropriate for tracing the history of employment than experience with unemployment. The assignment of serial numbers and securing the compliance of employers in reporting serial numbers might pose some problems, and the reporting itself could infringe upon individual civil liberties. The analysis of the data might also create obstacles in newly developing countries, particularly if the system were extended beyond secondary and

higher education to all primary schools and other learning institutions. Nevertheless, the possibilities for building more effective linkages between school and work are so great that they warrant serious consideration in most countries.

In conclusion, the most useful function of "tracer studies" is analysis of relationships between learning institutions and the world of work. If used widely, they could chart trends and provide warning signals indicating areas of imbalance between the learning and employment generation systems. They could supply much of the information required to determine the benefits of education and training programs. They have, of course, obvious limitations. In common with most other analytical tools, they are more easily applied to manpower in the modern than in the intermediate and traditional sectors. They record past actions and, by themselves, provide no forward estimates. Finally, the costs could be high and the implementation cumbersome. Clearly, the design of a nationwide tracer system is a formidable task that would require extensive experimentation.

NOTES

[1]Julius K. Nyerere, The Arusha Declaration and TANU's Policy on Socialism and Self-Reliance (Dar es Salaam: Publicity Section, TANU, 1967).

[2]Report of the Education Sector Review, Education: Challenge to the Nation (Addis Ababa: August 1972).

[3]Quoted in Robert M. Morgan and Clifton B. Chadwick, Systems Analysis for Educational Change: The Republic of Korea (Tallahassee: Department of Educational Research, Florida State University, 1971), p. 29.

[4]International Labour Organization, Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya, Geneva: 1972; _____, Employment and Income Policies for Iran, Geneva: 1973; _____, Matching Employment Opportunities and Expectations: A Programme of Action for Ceylon (2 vols.), Geneva: 1971; _____, Towards Full Employment: A Programme for Colombia, Geneva: 1970.

[5]See Daniel C. Rogers, "An Overview of Past Education Sector Loans and Some Points for the Future" (Washington, D.C.: U.S. AID, Bureau of Program and Policy Coordination, January 1972).

[6]See, for example, Overseas Liaison Committee, American Council on Education, Tanzania: A Nation-Wide Learning System (Washington, D.C.: November 1971). A report submitted to the Education Projects Department of IBRD, IDA, and the Government of Tanzania (restricted).

[7]Ministry of Education, Government of India, Report of the Education Commission of 1964-66 - Education and National Development (New Delhi: 1966).

[8]Education Sector Review, op. cit.

[9]International Labour Organization, op. cit.

[10]Education Sector Review, op. cit., Part III, pp. III-1 - 5.

[11]Ibid.

[12]James R. Sheffield and Victor P. Diejomaoh, Non-Formal Education in African Development (New York: African-American Institute, 1972).

[13]Cole S. Brembeck and Timothy J. Thompson (eds.), New Strategies for Educational Development (Lexington: D.C. Heath and Company, 1973).

[14]For examples of agricultural sector studies see George Rossmiller, et al, "Korean Agricultural Sector Analysis and Recommended Development Strategies, 1971-1985" (Korean Agricultural Sector Study Team, Department of Agricultural Economics, Michigan State University, East Lansing: 1972). J. Duloy, and R. Norton, "CHAC, A Programming Model of Mexican Agriculture", Multi-Level Planning: Case Studies in Mexico, edited by L.M. Goreux (Amsterdam: North Holland, 1973). L. Fletcher, William Merrill, Eric Graber and Erik Thorbecke, Guatemala Economic Development: The Role of Agriculture (Ames: Iowa State University Press, 1970). T.J. Manetsch, et al: A Generalized Simulation Approach to Agricultural Sector Analysis with Special Reference to Nigeria (East Lansing: Michigan State University, 1971).

[15]UNESCO, An Asian Model of Educational Development (Paris: 1966).

[16]Russell C. Davis, Planning Human Resource Development: Educational Models and Schemata (Chicago: Rand McNally and Company, 1966).

[17]Russell C. Davis, "Present Status and Future Developments of Models for Educational Planning" Paper presented in September, 1971, to the Seminar on Methodology of Human Resources Planning (Paris: Development Center, Organization for Economic Cooperation and Development, 1972).

[18]See, among others, International Council for Educational Development, various case studies on Nonformal Education for Rural Development (New York: 1972;(Overseas Liaison Committee, Tanzania: A Nation-Wide Learning System, op. cit.; James R. Sheffield and Victor P. Diejomaoh, op. cit.

[19]For further elaboration of this perspective, see Frederick H. Harbison, Human Resources as the Wealth of Nations (New York: Oxford University Press, 1973).

[20]Ibid., pp. 139-143.

[21]See Forecasting Manpower Needs for the Age of Science (Paris: OEEC, 1960); S.O. Doos, "Forecasting Manpower Requirements by Occupational Categories", prepared for Training Course for Human Resource Strategists, Frascati, Italy, September 1962 (Paris: OECD) (mimeographed); and National Science Foundation, The Long Range Demand for Scientific and Technical Personnel, A Methodological Study (Washington, D.C.: 1961).

[22]Herbert S. Parnes, Forecasting Educational Needs for Economic and Social Development, Mediterranean Regional Project (Paris: OECD, October 1962), and also Wilfred Beckerman, "Methodology for Projection of Educational Requirements", Mediterranean Regional Project (Paris: OECD, 1962) (mimeographed).

[23]For example, a Puerto Rican manpower survey made in 1957 assumed that industrial productivity in that country would rise by 1975 to the level of the United States in 1950, and that parallel occupational groups should have equivalent educational requirements. The survey of manpower and education requirements in Italy made its productivity calculation (except for agriculture) by assuming that in 1975 productivity would reach that attained by France in 1960. For further discussion of problems of productivity see Parnes, op. cit., and Michael Debeauais, "Methods of Forecasting Long-Term Manpower Needs," paper prepared for Training Course for Human Resource Strategists (Paris: OECD).

[24]Samuel Bowles, Planning Educational Systems for Economic Growth (Cambridge: Harvard University Press, 1969).

[25]Lucila Arrigazi, "Evaluating the Expansion of a Vocational Training Programme: A Chilean Experience" (Paris: UNESCO, IIEP, March, 1969); Robert M. Morgan and Clifton B. Chadwick, Systems Analysis for Educational Change: The Republic of Korea (op. cit.), pp. 26-40 and Appendix B, "Schooling and Earnings Differentials", by John Chang; T. Paul Schultz, "Returns to Education in Bogota, Colombia" (Santa Monica: The Rand Corporation, September 1968); Marcelo Selowsky, "The Effect of Unemployment as a Guide to Resource Allocation in Education: A Case Study on India" (Paris: UNESCO, IIEP, June 1969); Hans Heinrich Thias, "Cost-Benefit Analysis in Education: A Case Study on Kenya" (Washington, D.C.: IBRD, November 1969); Maureen Woodhall, "The Use of Cost-Benefit Analysis to Compare the Rates of Return at Different Education Levels: A Case Study on Colombia" (Paris: UNESCO, IIEP, March 1969).

[26]For further elaboration of this point see Edgar O. Edwards and Michael P. Todaro, "Educational Demand and Supply in the Context of Growing Unemployment in Less Developed Nations", paper presented at Conference on Education and Development Reconsidered (Bellagio: May 1972).

[27]Samuel Bowles, op. cit., pp. 207-208.